

Generation IV Roadmap Overview

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What is Technology Roadmapping?

- *A needs-driven technology planning process to help identify, select and develop technology.*
- *Given a set of needs, technology roadmapping*
 - *Addresses important performance targets*
 - *Identifies technologies that need to be developed to meet the targets*
 - *Makes choices and trade-offs among technology alternatives*
 - *Addresses the time frames for development activities*

Objectives of the Gen IV Technology Roadmap

- *Identify and evaluate high-performance concepts for next-generation nuclear power systems*
- *Identify needed technology development, and evaluate promising research paths*
- *Integrate the paths into an overarching R&D plan*
- *Set the stage for broader international collaboration*

Key Definitions

Gen IV System:

An entire energy production system, including the nuclear fuel cycle front and back end, the reactor, the power conversion equipment and its connection to the distribution system for electricity, hydrogen, process heat or fresh water, and the infrastructure for manufacture and deployment of the plant.

Concept:

An example of a Gen IV system with enough detail to allow evaluation against the goals, but broad enough to allow for optional features and trades.

The Two-year Roadmap in Brief

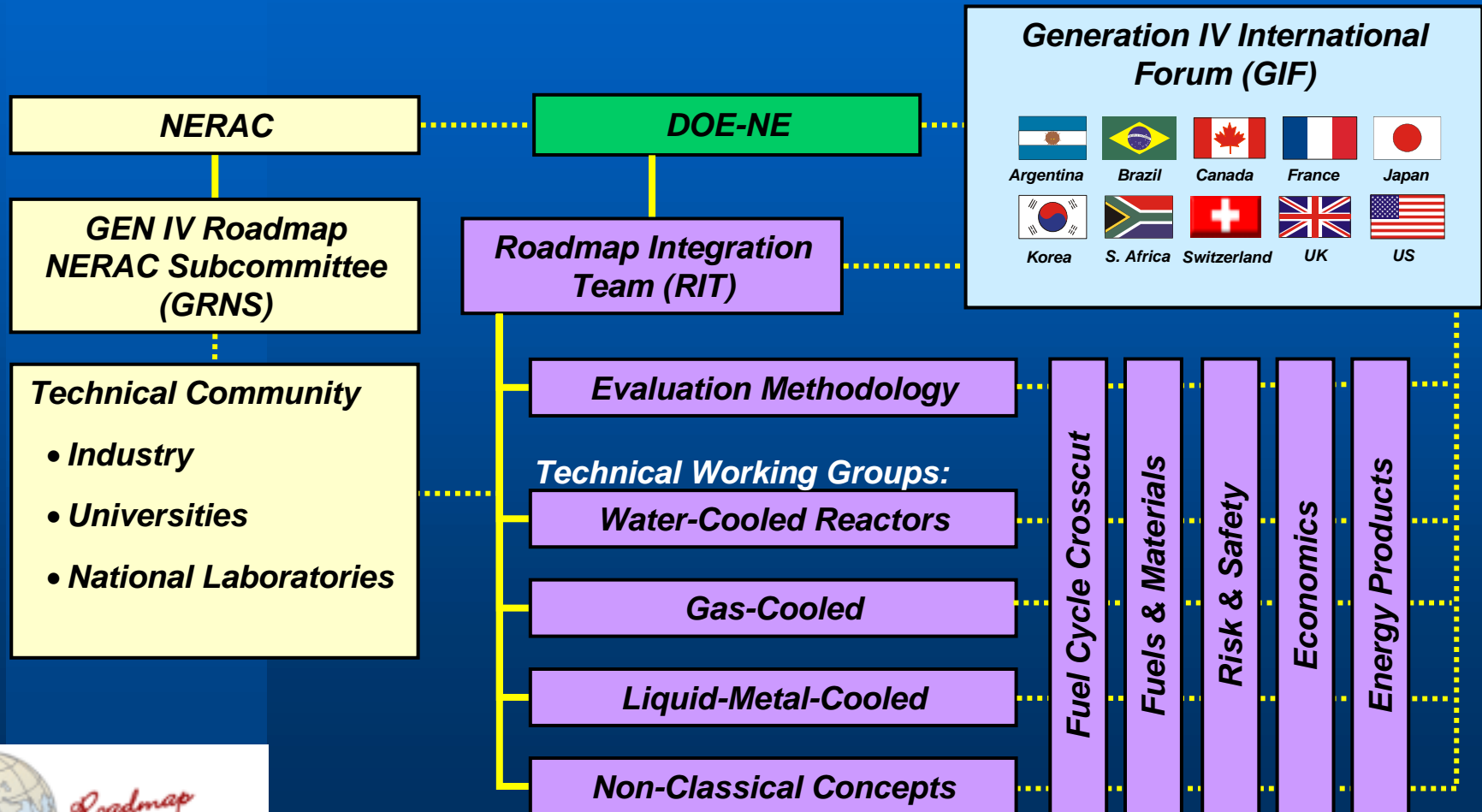
The First Year: Preparations and Study

- *Derive technology goals based on industry needs*
- *Plan and organize the activity*
- *Determine how to measure concepts against goals*
- *Identify concepts for evaluation*
- *Detail the most promising concepts*

The Second Year: Evaluate & Assemble

- *Evaluate and determine the most promising concepts*
- *Assemble a roadmap for R&D to support them*

Overall Roadmap Organization



Activities on the Two-year Timeline



*Technology Goals Document, and
Roadmap Development Guide*

Evaluation Methodology Group

Fuel Cycle Crosscut Group

Added Crosscut Groups:

*Economics, Safety,
Fuels & Materials,
Energy Products*

Technology Working Groups:

Water-cooled reactors

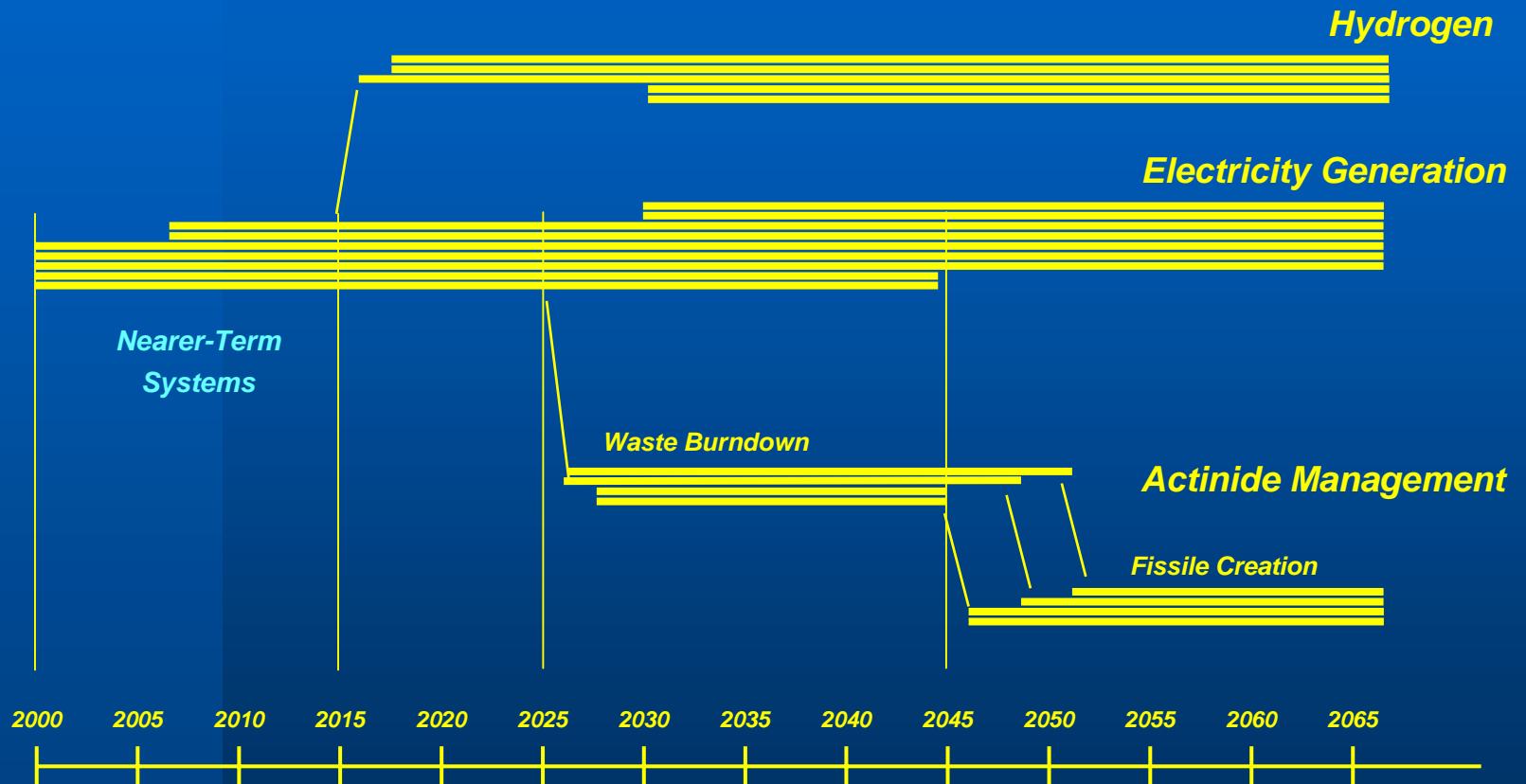
Gas-cooled reactors

Liquid-metal cooled reactors

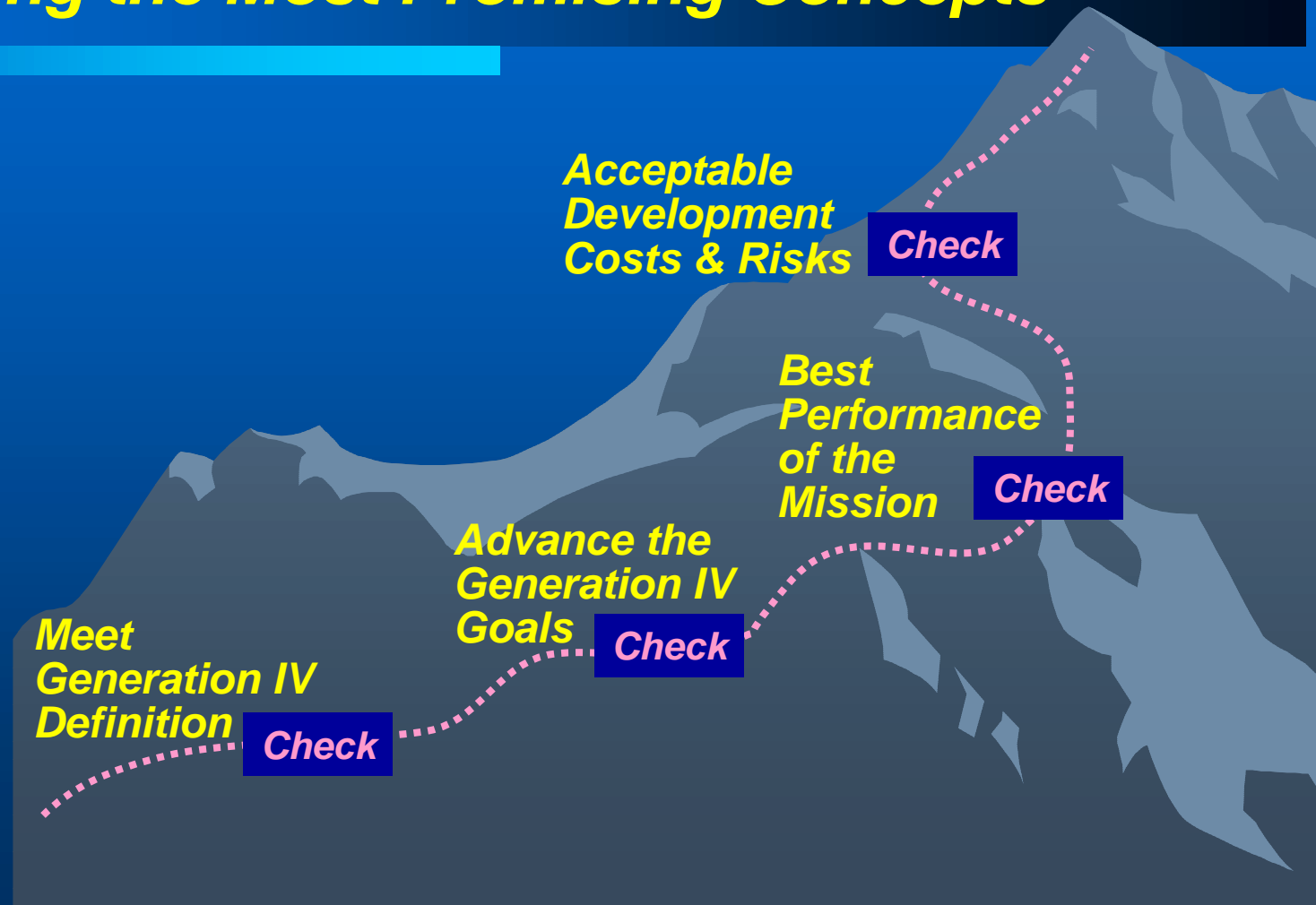
Non-classical reactors

Roadmap Reports

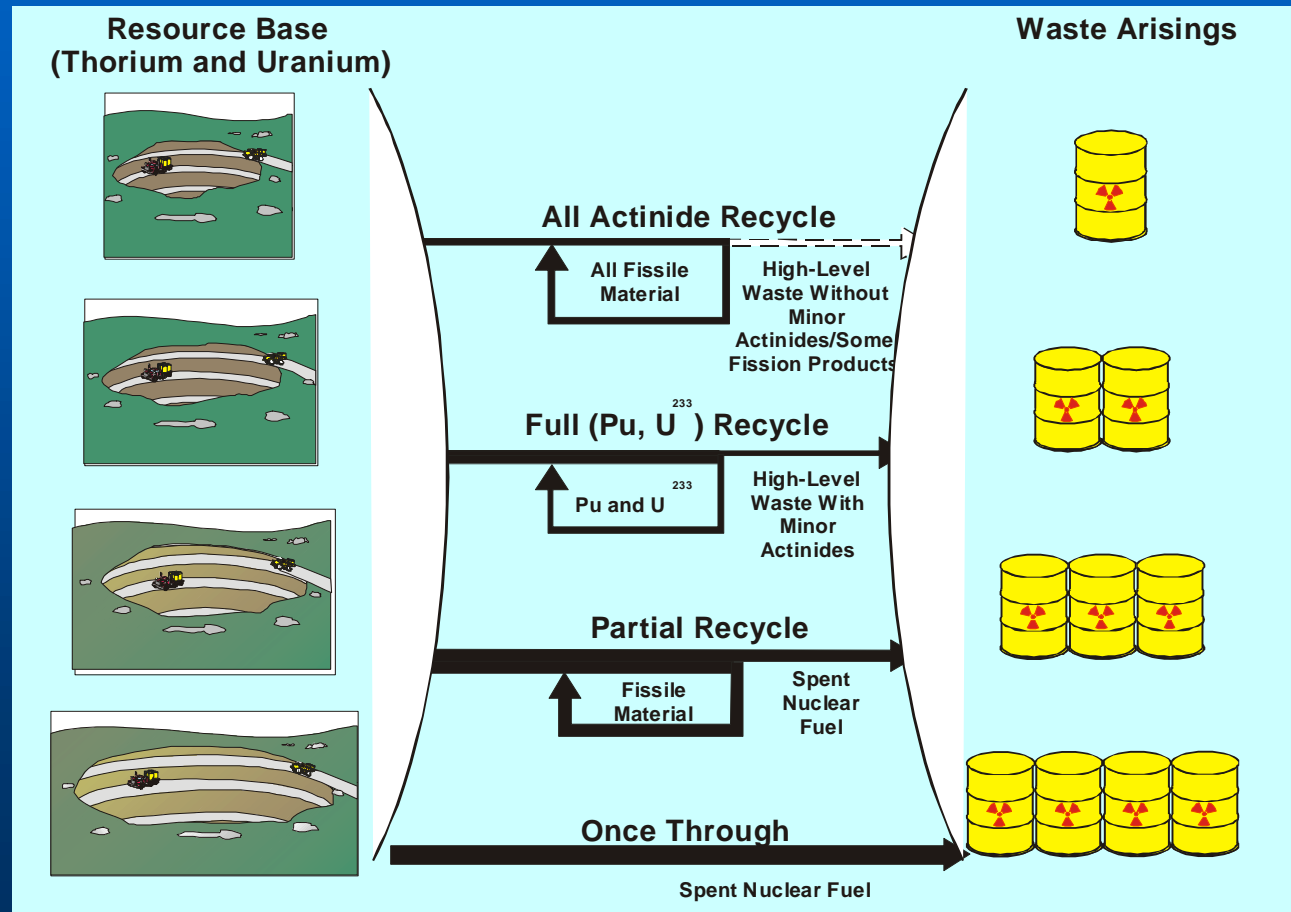
Important Missions for Generation IV



Selecting the Most Promising Concepts



Four Major Fuel Cycle Options Studied



Fuel Cycle Studies: Major Findings

- ***Closing the fuel cycle achieves:***
 - ***Reduced waste quantity and radiotoxicity***
 - ***Waste forms optimized for durability and leach resistance***
 - ***Optimal use of repository capacity through better decay heat management (100 y storage)***
 - ***Resource extension via regeneration of fissile material***
- ***A symbiotic mix of fast and thermal reactors reduces waste disposal challenges and overall system cost***
- ***R&D into fuel cycles that support the symbiotic mix of closed and open cycles is being studied***

Roadmap Documentation

Roadmap Summary

- *Sets the context and summarizes recommendations*
- *Written for non-technical audience*

Technical Roadmap

- *Provides additional technical descriptions, analysis, and justifications*
- *Written for nuclear technical audience*

Detailed Roadmap Reports

- *Eventually available on CD-ROM*

Conclusions

- *The Roadmap is a two-year project, to be completed at the end of FY-02*
- *Nearly 100 international experts staff the working groups, with significant industrial participation*
- *Over 100 ideas and concepts have been refined to about 20 most promising concepts; the objective is to get to 6-8 with long-term potential*
- *The primary objective of the Roadmap is to define an overall R&D plan to advance the concepts with significant international participation of the 10 countries in the Gen IV International Forum*

